

minimum of actual temperatures; the inclusion of these two maps is believed to be a novel feature.

The precipitation maps comprise: One map depicting the annual rainfall; six maps giving the monthly values for alternate months, beginning with January; the average annual snowfall. This distinction between rainfall and snowfall in maps of mean values of precipitation is also believed to be new.

Sea-level pressure, average cloudiness, and relative humidity are shown for January and July. The humidity data are the mean values of the 8 a.m. and 8 p.m. (E.S.T.) observation values; these mean values are considered to be more representative than either the morning or evening values taken alone, and constitute a third novel presentation.

The final map gives the average annual number of thunderstorm days, which is another map not heretofore available for the whole continent.

A brief text gives important details concerning the numbers and sources of the observations for the various political subdivisions, together with the names of the individuals credited with putting the data in their published form. Differences in the observing practices of the several meteorological services which affect these data are also noted.

The legends at the foot of each map point out the salient features of the maps as well as a few of the significant climatological facts. Prominently displayed on each map, also, are scales giving the English equivalents of the metric values.—Charles M. Lennahan.

**Recovery of sounding-balloon meteorograph after 23 years.**—A record for the interval of time between the release of a sounding balloon and the recovery of the meteorograph was probably established when an instrument which had been sent aloft on July 25, 1913, was found on October 22, 1936, more than 23 years later. The meteorograph was of the Bosch type, and will be placed in a permanent exhibit of meteorological instruments. It was found by Mr. Arthur L. Carey, about 25 miles south of Twenty Nine Palms, Calif., and was 1 of the 23 sent up by the Weather Bureau from Avalon, Calif., between July 23 and August 12, 1913. An account of this series was published in the MONTHLY WEATHER REVIEW, July 1914.

Except for the fact that apparently desert rodents had chewed off one of the pen arms, separated the linkages from the levers of the multiplying mechanisms, and destroyed the humidity element, the meteorograph was in surprisingly good condition; and the tracings on the smoked record sheet were still sufficiently legible to determine some of the principal features of the flight. It was impossible to evaluate the data for all significant points, but those of chief interest were obtained and are given below:

Height of tropopause	11,790 meters, m. s. l.
Maximum height reached	22,200 meters, m. s. l.
Temperature at tropopause	-56° C.
Temperature at maximum height	-57° C.

L. T. SAMUELS.

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[RICHMOND T. ZOCH, *in Charge of Library*]

By AMY D. PUTNAM

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## SOLAR OBSERVATIONS

### THE COMPUTATION OF $\beta$ AND $w$ FROM SOLAR RADIATION INTENSITY MEASUREMENTS

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In the MONTHLY WEATHER REVIEW for January 1937, page 18, reference is made to a previous intention that, beginning with January 1937, the Ångström-Hoelter-Feussner curves for the determination of  $\beta$  and  $w$  should replace the curves that had been computed by myself and had heretofore been used in the United States. Attention was drawn to the fact, however, that in almost the first attempt to use the new curves for computing  $\beta$  and  $w$  from intensity measurements obtained at the Blue Hill Observatory, the difference  $I_m - I$ , fell above the curved line representing  $\beta=0$ , while from my own curves a definite value of  $\beta$  was consistently obtained. The same circumstance occurred several times during January and February of the present year. Since a value of  $\beta$  less than zero can have no meaning, it is necessary to continue the use of my curves until the above discrepancy is explained.

Apparently, the difference in the two sets of curves arises from a higher value of  $I_m$  given by my computations

when  $\beta=0$ ; the difference from the European curves appears insignificant when  $m=0$ , but increases as  $m$  increases. The American curves (MONTHLY WEATHER REVIEW, 1933, pp. 82 and 83, figures 2, 3, and 4) were computed from Ångström's well known equations; but for  $\beta=0$ , data and equations originally developed by Lord Rayleigh and later modified by King, were employed. See Smithsonian Meteorological Tables, 5th revised edition, 1931, p. lxxxiii, and table iii, p. 240.

The following example will illustrate the reduction of pyrheliometric observations for the computation of  $\beta$  and  $w$ : The first line in the accompanying table gives the observed values at Blue Hill on February 27, 1937. In the second line these values have been reduced to mean solar distance. In the third line:  $I_m$  has been divided by 1.940 and is, therefore, represented as a percentage of the solar constant (71.1 percent);  $I$ , and  $I$ , have been further reduced by dividing them by the transmissions of the respective screens for a temperature three degrees higher than the air temperature at the time the measurements were made (table 4, MONTHLY WEATHER REVIEW, January 1936, p. 5).